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LAB REPORT
on
CN LAB REPORT

Submitted by

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in partial fulfillment for the award of the degree of
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in
COMPUTER SCIENCE AND ENGINEERING



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**B. M. S. College of Engineering,
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CERTIFICATE

This is to certify that the Lab work entitled “**LAB COURSE TITLE**” carried out by **BRIJESH GOWDA N (1BM21CS040)**, who is bonafide student of **B. M. S. College of Engineering**. It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2023. The Lab report has been approved as it satisfies the academic requirements in respect of a **Course Title - (Course code)** work prescribed for the said degree.

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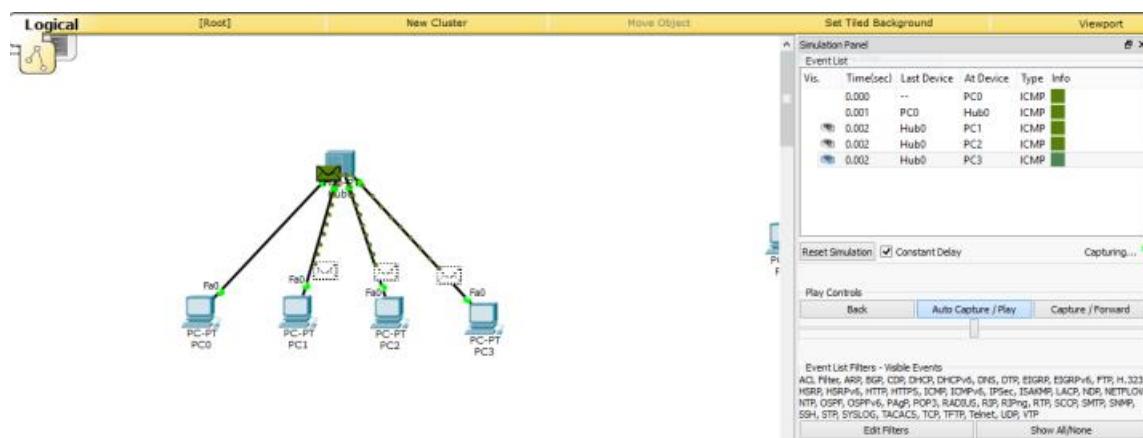
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Experiment -1

Aim: Create a topology and simulate sending a simple PDU from source to destination using hub and switch as connecting devices and demonstrate ping message.



Command Prompt

```
PC>reset
Invalid Command.

PC>clear
Invalid Command.

PC>cls
Invalid Command.

PC>cli
Invalid Command.

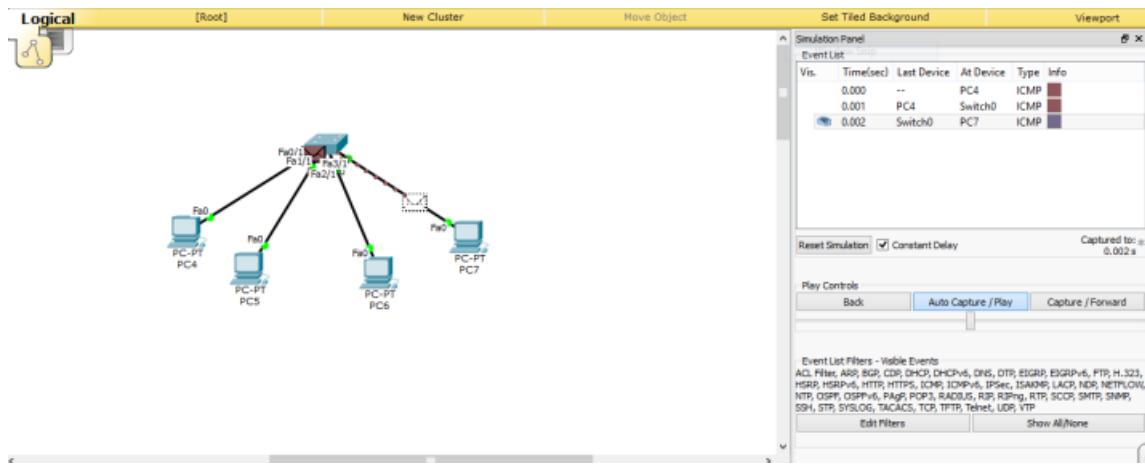
PC>
PC>
PC>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time=0ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>
```



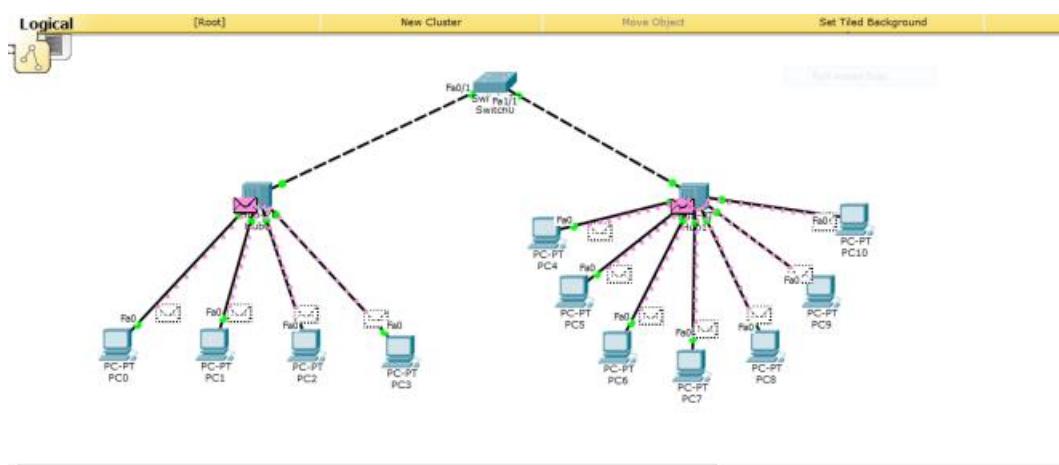
Command Prompt

```
PC>ping 10.0.0.11
Pinging 10.0.0.11 with 32 bytes of data:
Request timed out.

Ping statistics for 10.0.0.11:
  Packets: Sent = 1, Received = 0, Lost = 1 (100% loss),
Control-C
^C
PC>
PC>ping 10.0.0.
Ping request could not find host 10.0.0.. Please check the name and try again.
PC>ping 10.0.0.8
Pinging 10.0.0.8 with 32 bytes of data:

Reply from 10.0.0.8: bytes=32 time=1ms TTL=128
Reply from 10.0.0.8: bytes=32 time=0ms TTL=128
Reply from 10.0.0.8: bytes=32 time=0ms TTL=128
Reply from 10.0.0.8: bytes=32 time=0ms TTL=128

Ping statistics for 10.0.0.8:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
  Minimum = 0ms, Maximum = 1ms, Average = 0ms
PC>
```



Command Prompt

X

```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.10

Pinging 10.0.0.10 with 32 bytes of data:

Reply from 10.0.0.10: bytes=32 time=0ms TTL=128
Reply from 10.0.0.10: bytes=32 time=5ms TTL=128
Reply from 10.0.0.10: bytes=32 time=0ms TTL=128
Reply from 10.0.0.10: bytes=32 time=0ms TTL=128

Ping statistics for 10.0.0.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 5ms, Average = 1ms

PC>
```

(1) Create the Topology hence simulate sending the simple PDU from source to destination using a simple hub and switch as connecting device

Aim :- Create the topology & hence simulate sending the simple PDU from source to destination using a simple hub and switch as connecting device

Topology :-

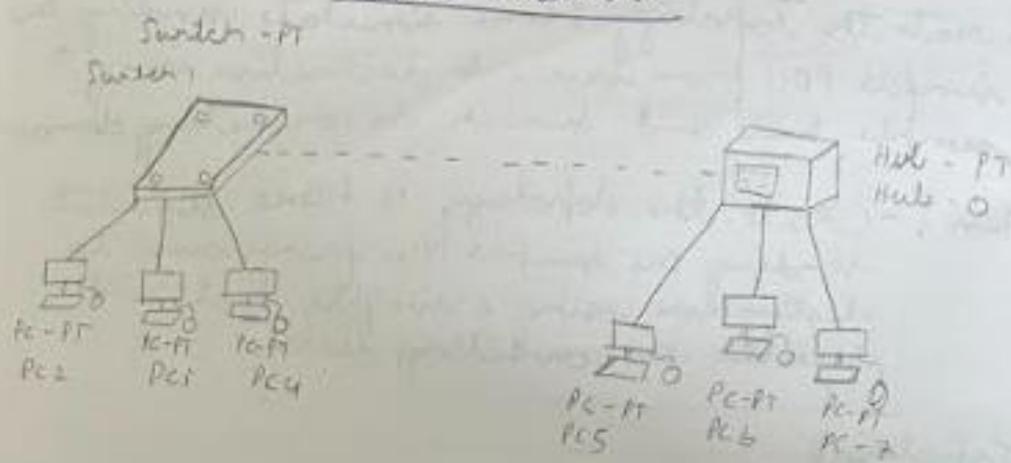
switch



hub



Mixed Network



Procedure

Switch - PC

- Place 3 generic PCs (PC2, PC3, PC4) and a generic switch (switch PT - switch -1)
- Connect the switch ports with all PC's using Copper-straight Through wires
- Configure the IP addresses of the PC's
 - PC2 (10.0.0.1)
 - PC3 (10.0.0.2)
 - PC4 (10.0.0.3)
- Click the add simple PDU option, select the source as PC2 and destination as PC - 4
- On Running the simulation the packet is traced from source to destination.

Hub - PC's

- follow the procedure as in the switch - PC
replace the switch with no hub.
- set IP address PC 5 ~~5.0.0.3~~ (10.0.0.4)
PC 6 (10.0.0.5)
PC 7 (10.0.0.6)
- Now connect the ~~switch~~ and the Hub with cables across our cable.
- ~~Switch~~ Stimulate the packet triangle from source to destination.

Output

PC > ping 10.0.0.3

pinging 10.0.0.3 with 32 bytes of data

Reply from 10.0.0.3: bytes=32 time=0ms TTL=128

Reply from 10.0.0.3: bytes=32 time=2ms TTL=128

Reply from 10.0.0.3: bytes=32 time=0ms TTL=128

Reply from 10.0.0.3: bytes=32 time=0ms TTL=128

Ping statistics for:- 10.0.0.3

Packets: sent = 4, Received = 4, Lost = 0

Average = Round trip time is milliseconds

minimum = 0ms, maximum = 2ms,

Average = 0ms

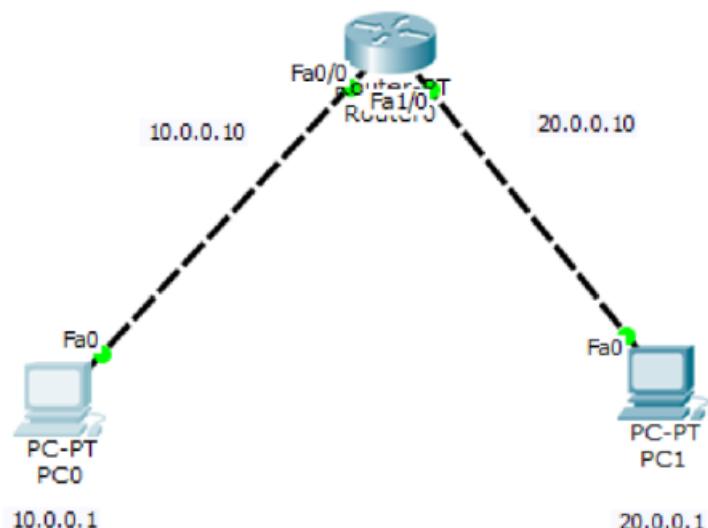
Observations

NF
3/8/2020

Experiment - 2

Aim:

Configure IP address to routers in packet tracer. Explore the following messages: ping responses, destination unreachable, request timed out, reply



Command Prompt

```
PC>ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data:

Request timed out.
Reply from 20.0.0.1: bytes=32 time=0ms TTL=127
Reply from 20.0.0.1: bytes=32 time=0ms TTL=127
Reply from 20.0.0.1: bytes=32 time=1ms TTL=127

Ping statistics for 20.0.0.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

```

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up
exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, FastEthernet1/0

```



Command Prompt

```

Packet Tracer PC Command Line 1.0
PC>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Reply from 10.0.0.10: Destination host unreachable.

Ping statistics for 40.0.0.1:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

```

```
Router(config)#ip route 10.0.0.0 255.0.0.0 20.0.0.10
Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.20
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

S    10.0.0.0/8 [1/0] via 20.0.0.10
C    20.0.0.0/8 is directly connected, Serial2/0
C    30.0.0.0/8 is directly connected, Serial3/0
S    40.0.0.0/8 [1/0] via 30.0.0.20
Router#

Router(config)#ip route 20.0.0.0 255.0.0.0 30.0.0.10
Router(config)#ip route 10.0.0.0 255.0.0.0 30.0.0.10
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

S    10.0.0.0/8 [1/0] via 30.0.0.10
S    20.0.0.0/8 [1/0] via 30.0.0.10
C    30.0.0.0/8 is directly connected, Serial2/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
Router#
```

```
Router(config)#ip route 30.0.0.0 255.0.0.0 20.0.0.20
Router(config)#ip route 40.0.0.0 255.0.0.0 20.0.0.20
Router(config)#show ip route
^
% Invalid input detected at '^' marker.

Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, Serial2/0
S    30.0.0.0/8 [1/0] via 20.0.0.20
S    40.0.0.0/8 [1/0] via 20.0.0.20
Router#
```

```
PC>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Reply from 40.0.0.1: bytes=32 time=16ms TTL=125
Reply from 40.0.0.1: bytes=32 time=2ms TTL=125
Reply from 40.0.0.1: bytes=32 time=12ms TTL=125
Reply from 40.0.0.1: bytes=32 time=23ms TTL=125

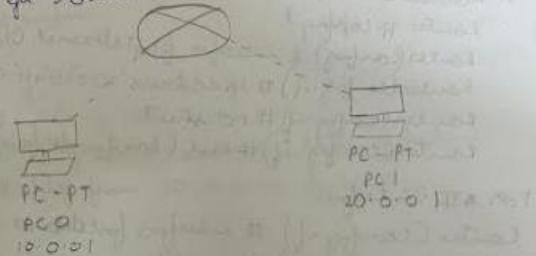
Ping statistics for 40.0.0.1:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 23ms, Average = 13ms
```

Lab - 2

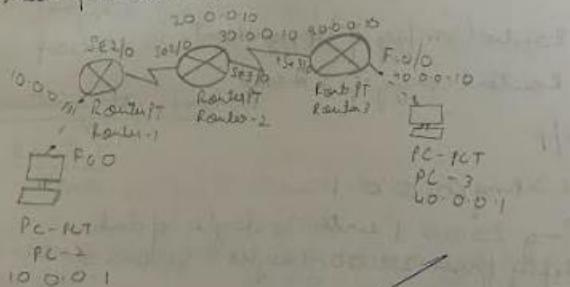
Aim :- To configure the address to route in hacket tracer and explore the following messages: ping response, destination unreachable, request timed out reply.

Topology :-

(i) Single router



(ii) Multiple routers :-



Procedure

(i) Single router

- Connect the 2 networks consisting of one end device each using a router or showing topology
- Set the IP address and gateway for each address

	IP address	Gateway
Device 1	10.0.0.1	10.0.0.10
Device 2	20.0.0.1	20.0.0.10

→ Configure the router using Command line interface

Router > enable

Router # config #

Router(config) # interface fastethernet 0/0

Router(config-if) # ip address 10.0.0.10 255.0.0.0

Router(config-if) # no shutdown

Router(config-if) # exit (exit interface)

For S/T interface

Router(config-if) # interface fastethernet 1/0

Router(config-if) # ip address 20.0.0.10 255.0.0.0

Router(config-if) # no shutdown

Router(config-if) # exit

O/P:

PC > ping 20.0.0.1

Ping 20.0.0.1 with 32 bytes of data

Reply from 20.0.0.1 bytes = 32 time = 1ms TTL = 127

Ping statistics for 20.0.0.1:

Packets sent = 4, Received = 4 Lost = 0

Approx round trip time in ms = 0

min = 0 max = 0 avg = 0

(iii) Multiple Router

- Connect an end-to-end device of network 10.0.0.0 to II network 20.0.0.0 via 3 routers shown in topology.
- Configure the IP address gateway of H end device.
- Configure the Router: each router, for each interface as followed for a single router. Step 3 of the procedure.

Ping O/P

PC > Ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data

Reply from 10.0.0.10: destination

ping stat for 20.0.0.1

Packets sent=27, received=25, lost=2

Routing the packets

Router 1

route (config) # IP route 30.0.0.0 255.0.0.0
20.0.0.0

route (config) # IP route 40.0.0.0 255.0.0.0
20.0.0.0

Router 2

route (config) # IP route 10.0.0.0 255.0.0.0
30.0.0.0

route (config) # IP route 20.0.0.0 255.0.0.0
30.0.0.0

O/P

PC> Ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data
Request timed out

Reply from 40.0.0.1 bytes = 32 time = 7 ms
 $TTL = 12$
 $time = 11 ms$
 $time = 10 ms$

Ping stats for 40.0.0.1

Packet sent = 4, Received = 3, lost = 1

Avg round trip time is ms

~~Round trip time~~

Min = 4 ms Max = 11 ms Avg = 7 ms

PC> Ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data

Reply from 40.0.0.1 bytes = 32, time = 10 ms
 $TTL = 12$

" " time = 2 ms TTL = 12

" " time = 2 ms TTL = 12

" " time = 2 ms TTL = 12

Ping stats for 40.0.0.1

Packet sent = 4, received = 4, lost = 0
Avg round trip time = 2 ms max = 2 ms min = 2 ms

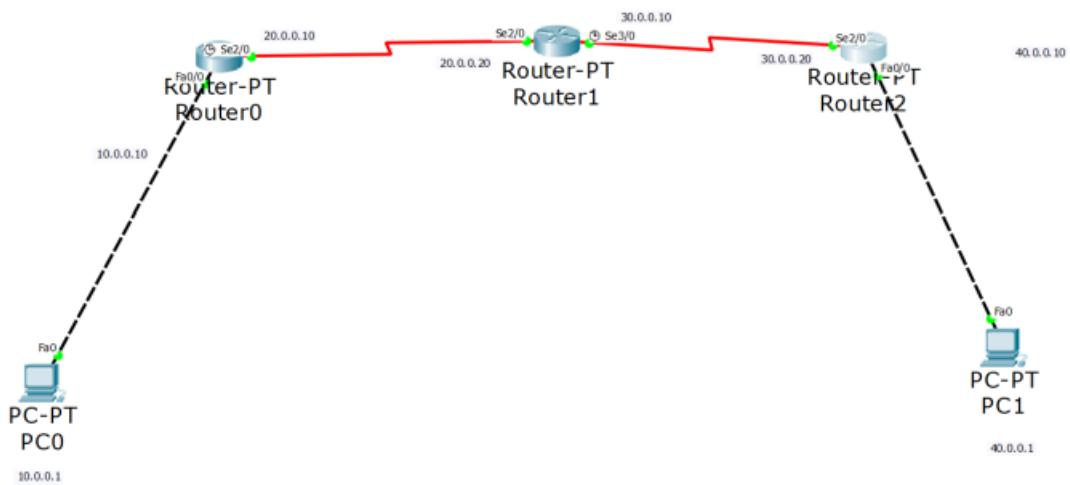
~~Round trip time~~

Observations:

Several different cases for ping response such as destination unreachable, request timed out & reply.

Experiment - 3

Aim: Configure default route, static route to the Router



```
IOS Command Line Interface
Router>enable
Router>configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router>(config)#interface FastEthernet0/0
Router>(config-if)#ip address 10.0.0.10 255.0.0.0
Router>(config-if)#no shutdown

Router>(config-if)#
$LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
$LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router>(config-if)#
Router>(config)#
Router>(config-if)#
$LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router>(config-if)#
$LINK-5-CHANGED: Interface Serial2/0, changed state to up
$LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router>(config-if)#
Router>(config)#
Router>#
$SYS-5-CONFIG_I: Configured from console by console
Router>ip address 0.0.0.0 0.0.0.0 20.0.0.20
% Invalid input detected at '^' marker.
Router>enable
Router>config t
Enter configuration commands, one per line. End with CNTL/Z.
Router>(config)#
$SYS-5-CONFIG_I: Configured from console by console
Router>exit
```

IOS Command Line Interface

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#no ip address
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip address 20.0.0.20 255.0.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#ip address 30.0.0.10 255.0.0.0
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial3/0, changed state to down
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

Router(config-if)#ip route 10.0.0.0 255.0.0.0 20.0.0.0
Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.0
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 10.0.0.0 255.0.0.0 20.0.0.10
Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.20
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

IOS Command Line Interface

```
--- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: n

Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#ip address 30.0.0.20 255.0.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
ip address 40.0.0.10 255.0.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#ip route 0.0.0.0 0.0.0.0 30.0.0.10
```

Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Request timed out.
Reply from 40.0.0.1: bytes=32 time=13ms TTL=125
Reply from 40.0.0.1: bytes=32 time=2ms TTL=125
Reply from 40.0.0.1: bytes=32 time=20ms TTL=125

Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 20ms, Average = 11ms
```

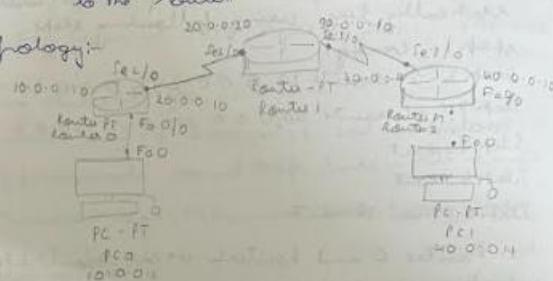
PC>

13/7/23

Labs - 3

Aim :- Configure default route, static route to no routes.

Topology:-



Procedure:-

- Connect 3 routers and 2 PC's using copper cross-over cable for PC to router and a serial DCE cable to connect router to router
- Set the IP address of both PC's and respective gateway numbers
- For all 3 routers set the respective IP address in CLI mode by using these commands

Step 1: Enable

Step 2: config

Step 3: Interface fastethernet 0/0

Step 4: IP address 10.0.0.10 255.0.0.0

Step 5: No shut

Step 6: Exit

Step 7: Interface 8P 2/0

Step 8: IP address 20.0.0.10 255.0.0.0

Step 9: No shut

Step 10: Exit

Step 11: Exit

→ Repeat these commands for other 2 routers with their respective IP addresses.

→ For Router 1, set IP routes of other 2 routers statically by using following steps.

Step 1: config T

Step 2: IP route 10.0.0.0 255.0.0.0 20.0.0.20

Step 3: IP route 40.0.0.0 255.0.0.0 30.0.0.20

Step 4: Exit

Step 5: Exit

Step 6: Show IP routes

For Router 0 and Router 2 we set default IP route which means it can access any IP address with any subnet mask.

Set the default IP route by following these commands

Step 1: config T

Step 2: IP route 0.0.0.0 0.0.0.0 20.0.0.20

Step 3: IP route 0.0.0.0 0.0.0.0 30.0.0.10

Step 2 is same (as Router 0 & Step 3 command for Router 1).

Go to PC's command prompt and type ping message to send packets across.

Ping Output:-

Packet Tracer PC command line 1.0
PC > Ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data.

Request Timed out.

Reply from 40.0.0.1: bytes=32 time=2ms TTL=125

Reply from 40.0.0.1: bytes=32 time=16ms TTL=125

Reply from 40.0.0.1: bytes=32 time=2ms TTL=125

Ping statistics for 40.0.0.1:

Packets: sent=6, received=3, lost=3 (50% loss)

Approximate round trip times in milliseconds

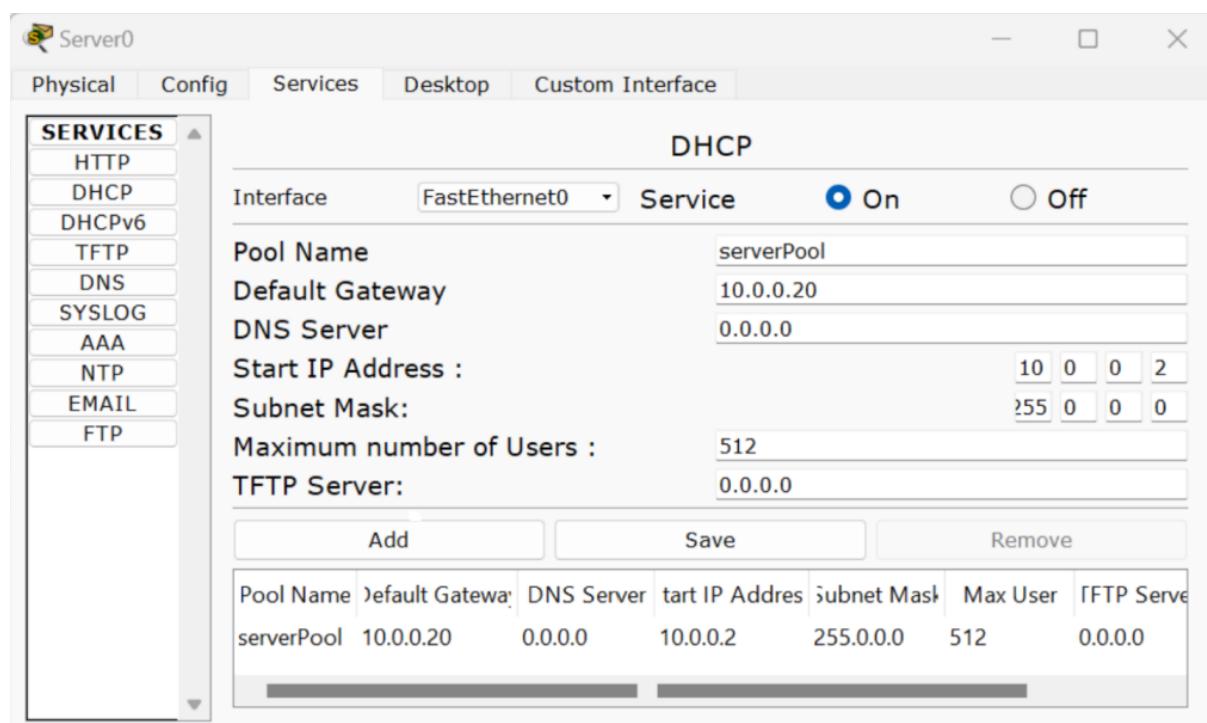
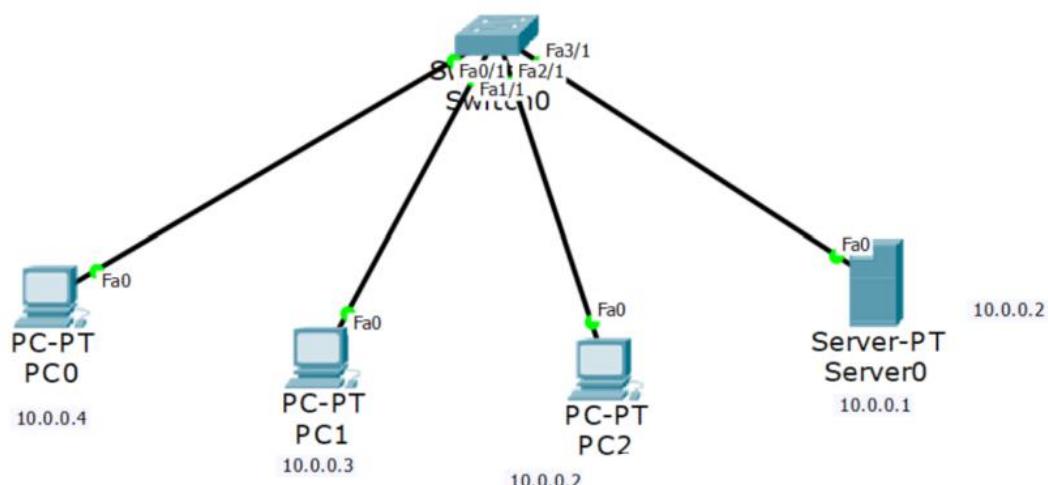
Minimum=2ms, Maximum=16ms, Average=6ms

Observation:-

- A default route is the route which takes effect when no other route is available for an IP address destination.
- If a packet is received, the device first checks the IP destination address, if the IP destination address is not local the device checks its routing table.
- If the route's destination subnet is not listed then the packet is forwarded to the next hop towards the destination using the default route.
- The process repeats until the packet is delivered.

Experiment - 4

Aim: Configure DHCP within a LAN and outside LAN.



Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time=1ms TTL=128
Reply from 10.0.0.2: bytes=32 time=1ms TTL=128
Reply from 10.0.0.2: bytes=32 time=0ms TTL=128
Reply from 10.0.0.2: bytes=32 time=0ms TTL=128

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time=1ms TTL=128
Reply from 10.0.0.3: bytes=32 time=12ms TTL=128
Reply from 10.0.0.3: bytes=32 time=0ms TTL=128
Reply from 10.0.0.3: bytes=32 time=0ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 12ms, Average = 3ms
```

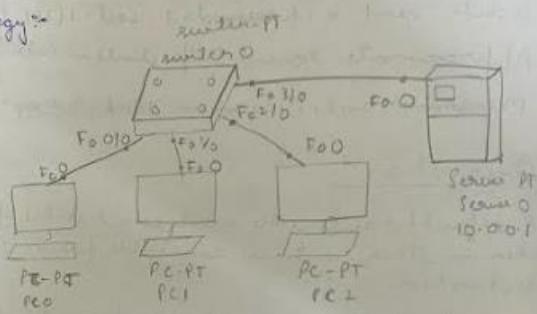
13/9/23

Lab-4

Program - 4.1

Aim - Configure DHCP within a LAN and outside LAN.

Topology :-



Procedure :-

- Connect 3 PCs and 1 server to a switch using upper straight through cable.
- Click on server and go to services tab
select DHCP and turn on the DHCP service
- Set the IP address of the start IP address as 10.0.0.2 and click on save button.
- Before this, set the IP address of server in config tab under fastethernet as 10.0.0.1
- Next click on PC0 and go to desktop tab, then click on IP configuration. Select DHCP here. It will request for an IP address and successfully get the DHCP Request also set the address

- Speed this step for other PCs
- To send a packet across PC's, go to PC's command prompt and type ping destination IP address

Ping Output

Observation

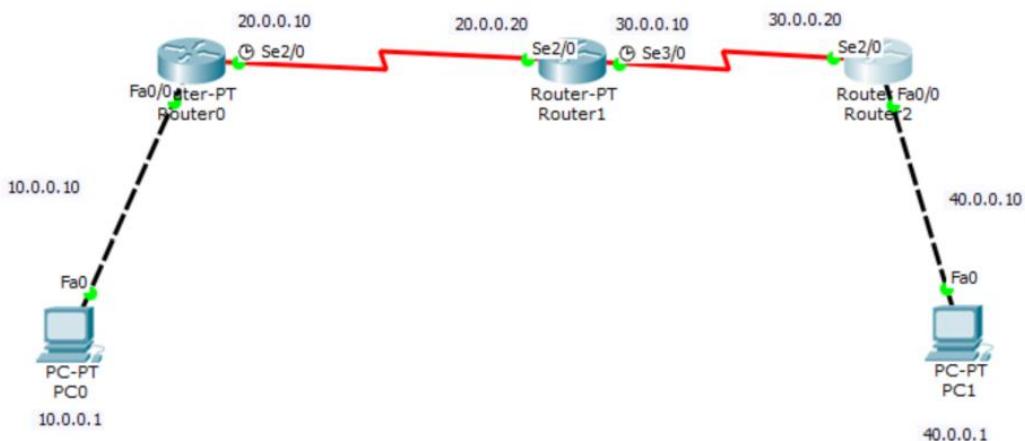
- DHCP is used to dynamically assign an IP address to any device or node.
 - It is a client server protocol in which servers manage a pool of unused IP address and also about client configuration parameters.
 - DHCP enabled clients sends a request to DHCP server when they want to connect to a network.
 - The DHCP server responds to the client request by providing IP configuration information from address pool.

ports, previously specified by a network administrator.

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3/8/2023

Experiment - 5

Aim: Configure RIP routing Protocol in Routers



```
Router#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 10.0.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

C    10.0.0.0/8 is directly connected, FastEthernet0/0
      20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C          20.0.0.0/8 is directly connected, Serial2/0
C          20.0.0.20/32 is directly connected, Serial2/0
R    30.0.0.0/8 [120/1] via 20.0.0.20, 00:00:18, Serial2/0
R    40.0.0.0/8 [120/2] via 20.0.0.20, 00:00:18, Serial2/0
Router#
```

```

Router#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 20.0.0.0
Router(config-router)#network 30.0.0.0
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

R    10.0.0.0/8 [120/1] via 20.0.0.10, 00:00:20, Serial2/0
    20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C      20.0.0.0/8 is directly connected, Serial2/0
C      20.0.0.10/32 is directly connected, Serial2/0
        30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        30.0.0.0/8 is directly connected, Serial3/0
C        30.0.0.20/32 is directly connected, Serial3/0
R    40.0.0.0/8 [120/1] via 30.0.0.20, 00:00:19, Serial3/0
Router#

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#network 30.0.0.0
^
% Invalid input detected at '^' marker.

Router(config)#router rip
Router(config-router)#network 30.0.0.0
Router(config-router)#network 40.0.0.0
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

R    10.0.0.0/8 [120/2] via 30.0.0.10, 00:00:14, Serial2/0
R    20.0.0.0/8 [120/1] via 30.0.0.10, 00:00:14, Serial2/0
    30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C      30.0.0.0/8 is directly connected, Serial2/0
C      30.0.0.10/32 is directly connected, Serial2/0
C      40.0.0.0/8 is directly connected, FastEthernet0/0
Router#

```

```

Packet Tracer PC Command Line 1.0
PC>ping 40.0.0.1

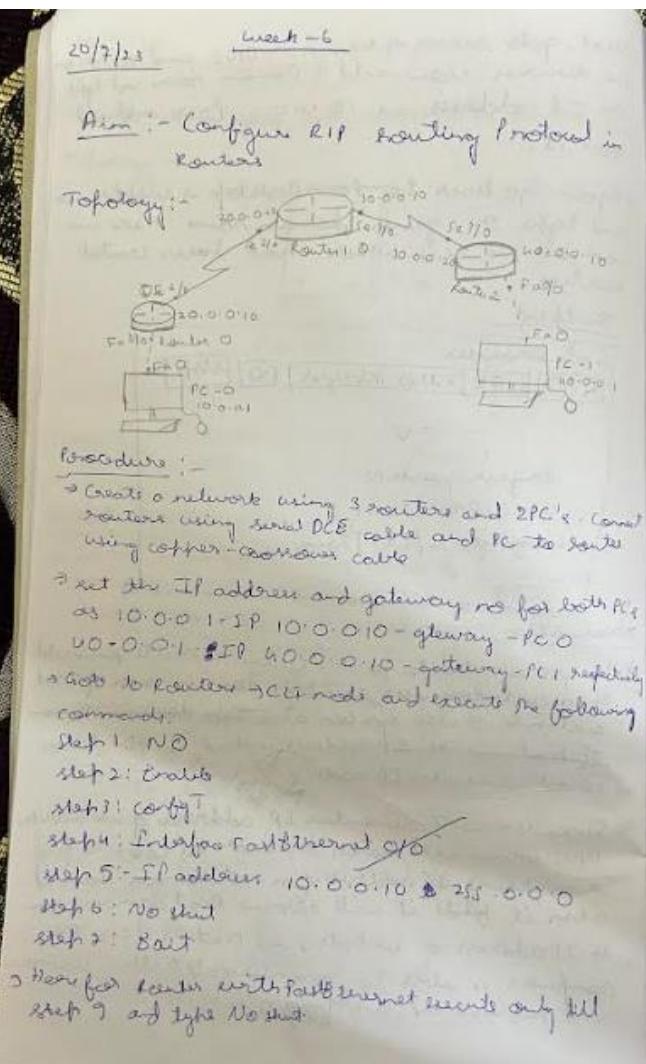
Pinging 40.0.0.1 with 32 bytes of data:

Request timed out.
Reply from 40.0.0.1: bytes=32 time=10ms TTL=125
Reply from 40.0.0.1: bytes=32 time=7ms TTL=125
Reply from 40.0.0.1: bytes=32 time=10ms TTL=125

Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 7ms, Maximum = 10ms, Average = 9ms

```

PC>



→ Open up to Router 0 → c12 mode and type these steps:-

- Step 1 :- Config T
- Step 2 :- Router#
- Step 3 :- Network 10.0.0.0
- Step 4 :- Network 20.0.0.0
- Step 5 :- Exit

→ Repeat these steps for all routers

→ At last now go to each router and type show ip route here in if address associated with the router will be labelled as R0 and other IP addresses are labelled as R.

Traffic output :-

→ Logged from PC command Line 10

PC > Ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data

Request timed out:-

Reply from 10.0.0.1: bytes=32 time=8ms TTL=125

Reply from 10.0.0.1: bytes=32 time=5ms TTL=125

Reply from 10.0.0.1: bytes=32 time=10ms TTL=125

Observation :-

→ RIP is a dynamic routing protocol that uses hop count or routing metric to find the best path between source and destination.

→ Hop count is the no. of routers coming in between source and destination.

→ Update of routing information are always ~~broadcasts~~ ^{Netw/23}

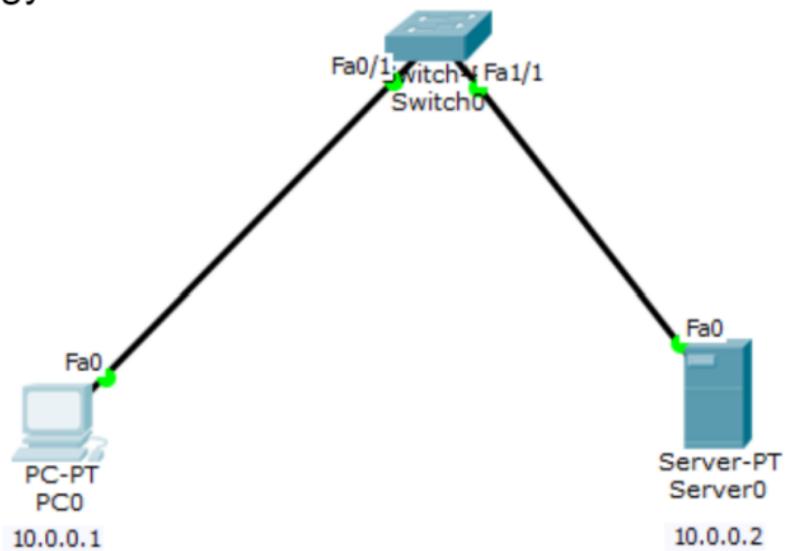
→ Full routing tables are sent in updates

→ Routers always trust routing information received from Neighbors routers.

Experiment - 6

Aim: Configure Web Server, DNS within a LAN.

Topology :



Physical Config Services Desktop Custom Interface

SERVICES

- HTTP
- DHCP
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP

HTTP

On Off

HTTPS

On Off

File Manager

File Name	Edit	Delete
1 copyrights.html	(edit)	(delete)
2 cscoptlogo177x...		(delete)
3 helloworld.html	(edit)	(delete)
4 image.html	(edit)	(delete)
5 index.html	(edit)	(delete)
6 profile.jpg		(delete)

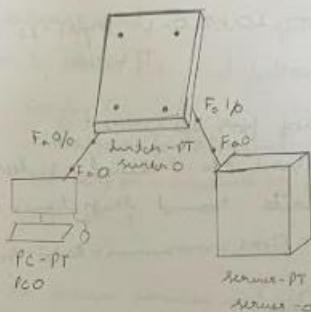
New File Import

20/7/23

Lab-5

Aim :- Configure Web server, DNS within LAN

Topology :-



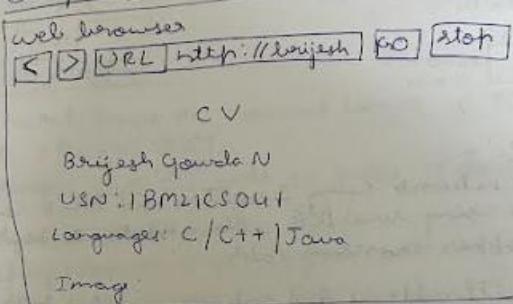
Procedure:

- Connect a switch, PC and a server to form a LAN
- Set PC & IP address by clicking on it and go to config tab. There is fast option, set IP address as 10.0.0.1 and subnet mask.
- Set servers IP address as 10.0.0.2 and subnet mask respectively.
- Go to PC's Desktop and click on web browser in the URL tab type 10.0.0.2. You will get a default display.
- To make a CV here, we need to make changes in server services.
- Go to Server Services → HTTP → index.html.htm. Create the CV and click on save.
- Again go to PC → Desktop → web browser and type 10.0.0.2.

→ Next, go to Services → DNS and switch on the services. Now add a Domain name and type the IP address as 10.0.0.2. Press add and save it.

→ Again go back to PC → Desktop → webserver and type the given domain name. Here we can see the CV which had been created earlier.

Output



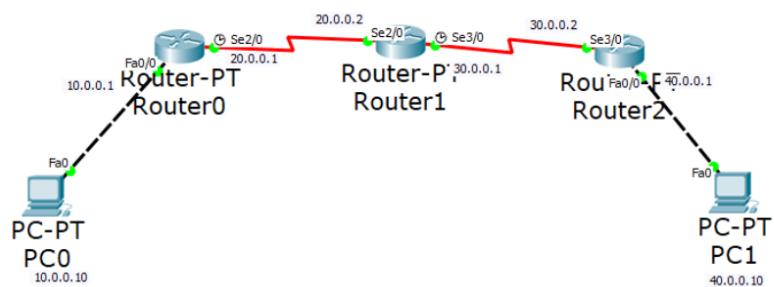
Explanation:-

- If you wanted to go to a certain website you would open web browser and type domain name of that website or else you can also type domain name of that website or IP address instead if you knew that website's IP address.
- Since we can't remember IP addresses of all websites, DNS server will search through its cache to find a matching IP address for that domain name and when it finds it will resolve that domain name to IP address of website, and that is how our computer is able to communicate with a webserver and retrieve the web page.

Experiment- 7

Aim: Configure OSPF routing protocol

Topology:



Router2

Physical Config CLI

IOS Command Line Interface

```
Loading Done

Router>enable
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

O IA 10.0.0.0/8 [110/129] via 30.0.0.1, 00:00:33, Serial3/0
O IA 20.0.0.0/8 [110/128] via 30.0.0.1, 00:00:43, Serial3/0
      30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
      C     30.0.0.0/8 is directly connected, Serial3/0
      C     30.0.0.1/32 is directly connected, Serial3/0
C     40.0.0.0/8 is directly connected, FastEthernet0/0
C     172.16.0.0/16 is directly connected, Loopback0
Router#
```

Copy Paste

PC0

Physical Config Desktop Custom Interface

Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.10

Pinging 10.0.0.10 with 32 bytes of data:

Reply from 10.0.0.10: bytes=32 time=4ms TTL=128
Reply from 10.0.0.10: bytes=32 time=7ms TTL=128
Reply from 10.0.0.10: bytes=32 time=7ms TTL=128
Reply from 10.0.0.10: bytes=32 time=8ms TTL=128

Ping statistics for 10.0.0.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 8ms, Average = 6ms

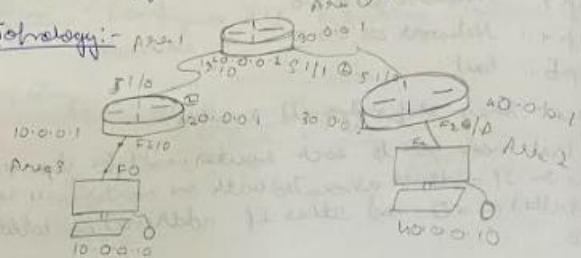
PC>
```

27/7/23

Week - 7

Aim:- Configure OSPF routing protocol

Topology:-



Procedure:

- Create the topology using 3 routers & 2 PCs
- Configure the PCs with IP address and gateway
- Configure each of the routers acc. to IP address given.
- Execute the following commands.
Router >tel > config mode.
 - Step 1: - Router #if 1
 - Step 2: - router-id 1.1.1.1
 - Step 3: - Network 10.0.0.0
 - Step 4: Network 20.0.0.0
 - Step 5: exit
- Repeat these commands for other routers.
- Then type show ip route
- Next to set loopback
 - Step 1: (in config if mode) interface loopback 0
 - Step 2: IP address 17.2.16.1 255.255.0.0
 - Step 3: No shut down
- Repeat these step 3 for other 2 routers

→ Create virtual link b/w R1, R2 by this we
create a virtual link ~~between~~ to connect to
areas.

→ In config mode of R1

Step 1: Router ospf 1

Step 2: area1 virtual-link 2 2 2

Step 3: # enter/exit

In route 2 config - mode

Step 1: # Router ospf 1

Step 2: area1 virtual-link 1 1 1 1

Step 3: exit

Step 4: #

→ Check the routing table, show ip route

→ Lastly ping messages from PC to PC

Ping output:-

→ Packet traces PC command line 10

PC > Ping 40.0.0.10

Pinging 40.0.0.10 with 32 bytes of data

Request timed out

Reply from 40.0.0.10: bytes=32 time=11ms TTL=125

Reply from 40.0.0.10: bytes=32 time=11ms TTL=125

Reply from 40.0.0.10: bytes=32 time=8ms TTL=125

→ Ping statistics for 40.0.0.10:

Packets sent = 4, received = 3, lost = 1 (25% loss)

Avg round trip times in milliseconds

min= 8ms max= 10ms avg= 10ms

Observation:-

* OSPF is a link-state routing protocol that is
used to find the best path between source
and destination route using its own SPF
Algorithm.

→ This network is divided into 4 areas. One area is the backbone.

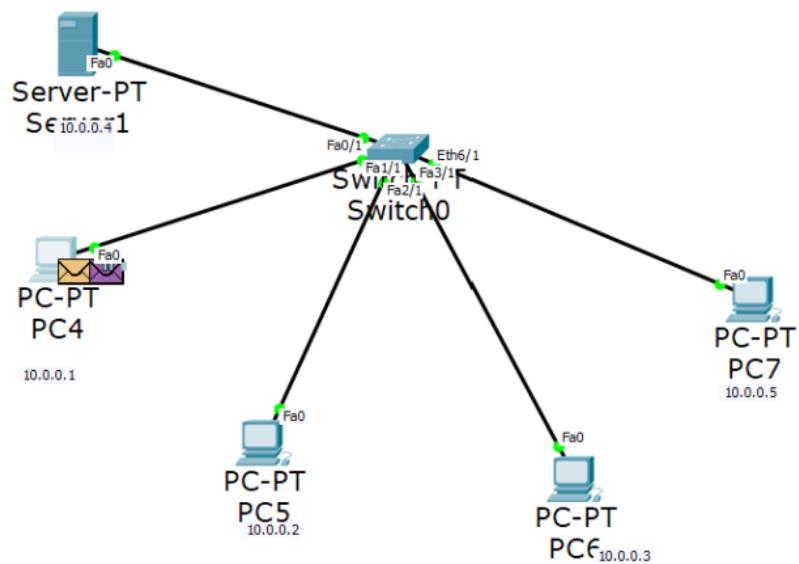
→ After we make the virtual-link between the area which is not connected to the backbone area, we can ping messages successfully.

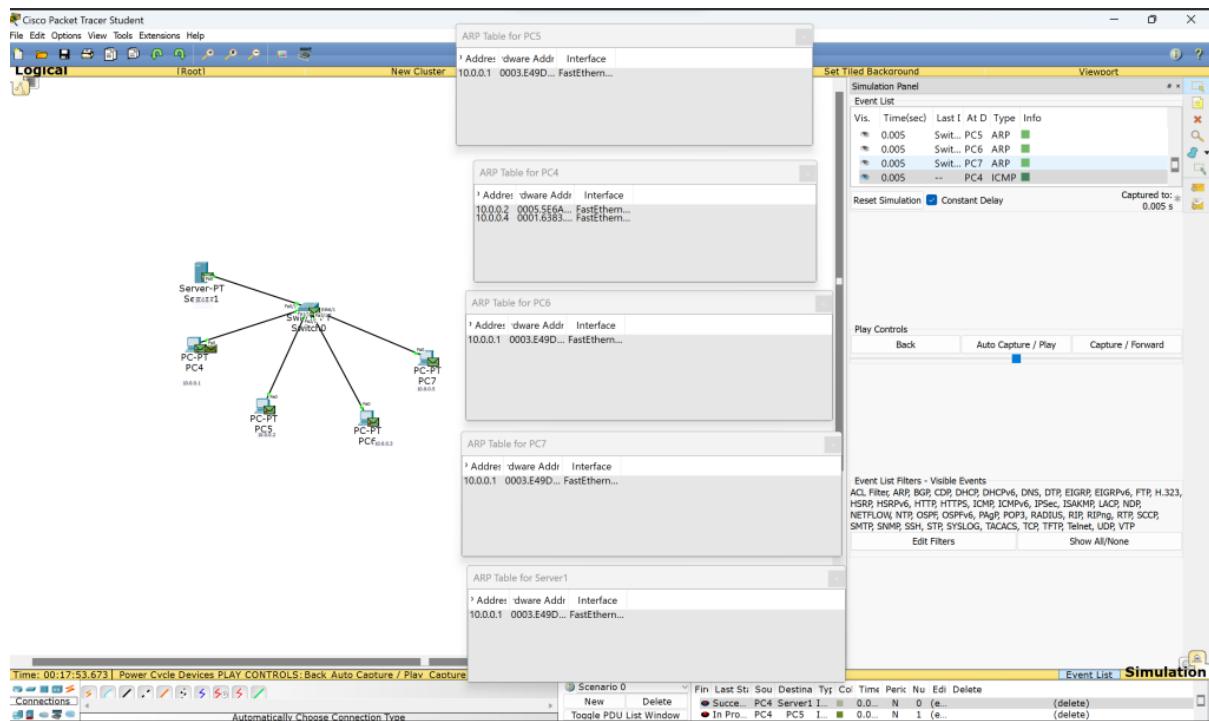
N.D
31/8/2023

Experiment - 8

Aim: To construct simple LAN and understand the concept and operation of Address Resolution Protocol (ARP)

Topology:





Physical Config CLI

IOS Command Line Interface

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet1/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet2/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet2/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet3/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet3/1, changed state to up
%LINK-5-CHANGED: Interface Ethernet6/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet6/1, changed state to up
Switch(config)#show mac address-table
^
% Invalid input detected at '^' marker.

Switch(config)#exit
Switch#show mac address-table
  Mac Address Table
-----
Vlan      Mac Address          Type      Ports
----      -----              -----      -----
  1        0001.6383.ddb2    DYNAMIC   Fa0/1
  1        0003.e49d.b2d9    DYNAMIC   Fa1/1
  1        0004.9a42.616c    DYNAMIC   Eth6/1
  1        0005.5e6a.7da2    DYNAMIC   Fa2/1
  1        0030.f285.7a19    DYNAMIC   Fa3/1
Switch#|
```

Copy

Paste

PC4

Physical Config Desktop Custom Interface

Command Prompt

```

Packet Tracer PC Command Line 1.0
PC>arp -a
No ARP Entries Found
PC>arp -a
  Internet Address      Physical Address      Type
  10.0.0.4                0001.6383.ddb2    dynamic
PC>arp -a
  Internet Address      Physical Address      Type
  10.0.0.2                0005.5e6a.7da2    dynamic
  10.0.0.4                0001.6383.ddb2    dynamic
PC>arp -a
  Internet Address      Physical Address      Type
  10.0.0.2                0005.5e6a.7da2    dynamic
  10.0.0.3                0030.f285.7a19    dynamic
  10.0.0.4                0001.6383.ddb2    dynamic
  10.0.0.5                0004.9a42.616c    dynamic
PC>

```

3/2/23 Lab - 8

Aim :- To construct single LAN and understand the concept and operating of Address Resolution Protocol (ARP)

Topology :-

Procedure :-

- Create a topology of PC's and servers.
- Assign IP address to all PCs and servers.
- Connect them through the switch.
- Use the inspect ~~tool~~ tool to click on PC to see ARP table.
- Command in cmd for the same is arp -a.
- Initially ARP table is empty.
- Also in ~~the~~ CII of switch, the command shows mac address table can be given an entry manually to see how the switch learns from transactions and build its address table.
- Use the capture button in the simulation panel to go step by step so that the changes in ARP can be clearly noted.

Ping Output :-

```

PC> ping 10.0.0.4
Pinging 10.0.0.4 with 32 bytes of data

```

Reply from 10.0.0.4: bytes=32 time=0ms TTL=128
Reply from 10.0.0.4: bytes=32 time=0ms TTL=128
Reply from 10.0.0.4: bytes=32 time=0ms TTL=128
Reply from 10.0.0.4: bytes=32 time=0ms TTL=128

Ping statistics for 10.0.0.4:

Packets: sent=4 received=4 lost=0 (0% loss)
Approximate round trip times in milliseconds:
min=0ms max=0ms avg=0ms

pc>arp a

Internet address	Physical Address	Type
10.0.0.4	0060-2f00-3e4d	Ethernet

Observation:-

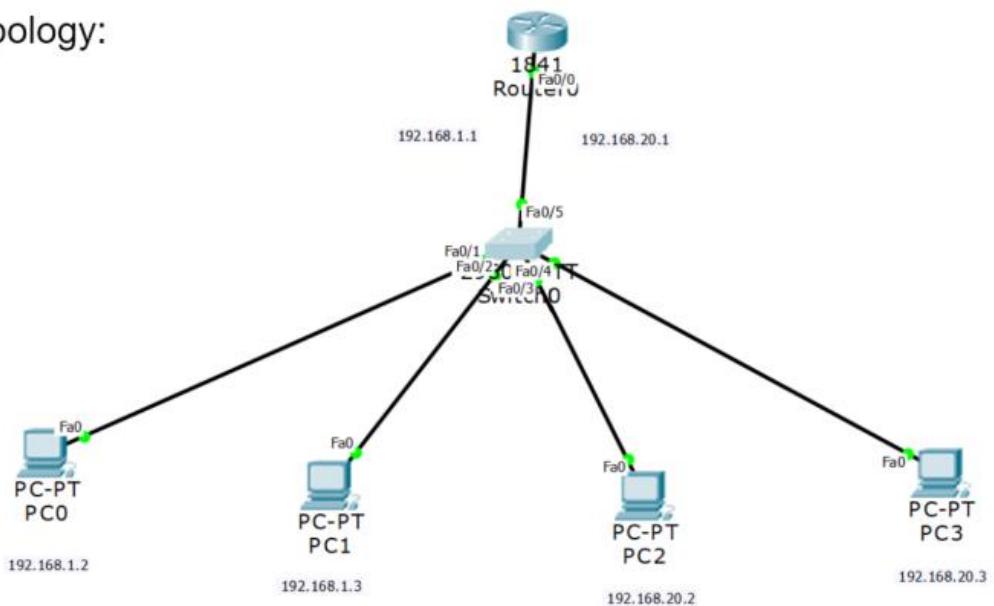
- When we ping 1 PC and server the address of server is known to PC so we know.
- When we ping b/w other 2 PC's simultaneously one address of each other can known.
- Every time a host request a MAC address in order to send a packet to another host in the LAN, it checks its ARP cache to see if the IP to MAC address translation address already exist. If no translation doesn't exist it performs ARP.

N
9/8/2023

Experiment - 9

Aim: To construct a VLAN and make the PC's communicate among a VLAN

Topology:



```
--- System Configuration Dialog ---  
Continue with configuration dialog? [yes/no]: n  
  
Press RETURN to get started!  
  
Router>enable  
Router#vlan database  
% Warning: It is recommended to configure VLAN from config mode,  
as VLAN database mode is being deprecated. Please consult user  
documentation for configuring VTP/VLAN in config mode.  
  
Router(vlan)#vlan 20 name NEWVLAN  
VLAN 20 modified:  
  Name: NEWVLAN  
Router(vlan)#exit  
APPLY completed.  
Exiting...  
Router#config t  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#int fa0/5  
%Invalid interface type and number  
Router(config)#int fa0/0  
Router(config-if)#ip address 192.168.1.1 255.255.255.0  
Router(config-if)#no shut  
  
Router(config-if)#  
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up  
  
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up  
exit  
Router(config)#int fa 0/0.1  
Router(config-subif)#  
%LINK-5-CHANGED: Interface FastEthernet0/0.1, changed state to up  
  
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.1, changed state to up  
Router(config-subif)#encapsulation dot1q 20  
Router(config-subif)#ip address 192.168.20.1 255.255.255.0  
Router(config-subif)#no shut  
Router(config-subif)#exit  
Router(config)#+
```

PC0

Physical Config Desktop Custom Interface

Command Prompt X

```
PC>ping 192.168.20.2

Pinging 192.168.20.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.20.2:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC>ping 192.168.20.2

Pinging 192.168.20.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.20.2: bytes=32 time=0ms TTL=127
Reply from 192.168.20.2: bytes=32 time=1ms TTL=127
Reply from 192.168.20.2: bytes=32 time=1ms TTL=127

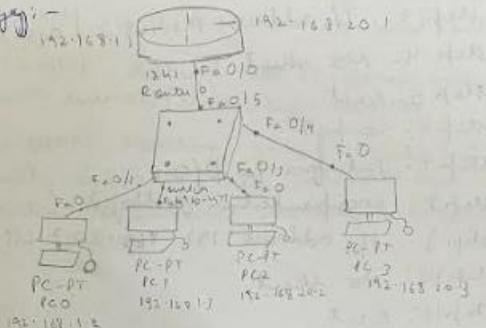
Ping statistics for 192.168.20.2:
  Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
  Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>
```

Lab - 9

Aim:- To construct a VLAN and make a PC communicate among VLAN

Topology:-



Procedures

- Create a topology as shown above, choose 1841 router and 2960-24TT switch.
- Set the IP address of the router and 4 PCs respectively, we use class C type addresses also gateway.
- In switch, go to config tab and select VLAN Database. Give any VLAN no. like 2 and name as **Vlan**.
- Select the interface fastethernet 0/1 and make it trunk.
- Next select the switches under 2nd interface which has interface ~~Fast~~ 0/3 and 0/4. Click on each of them and set VLAN number 2.
- Go to router → config tab and select VLAN database and enter the name **vlan** and no 2 created.

Go to router > CLI and type in following commands.

- Step 1: - config T
- Step 2: interface fa 0/0
- Step 3: If address 192.168.1.1 255.255.255.0
- Step 4: No shut
- Step 5: Exit
- Step 6: Config T
- Step 7: Interface fa 0/0.
- Step 8: encapsulation dtag 2
- Step 9: ip address 192.168.2.0 255.255.255.0
- Step 10: No shut
- Step 11: Exit

→ Ping message from R to another VLAN PC

PING OUTPUT

Packet trace file command line 1:0

PC > ping 192.168.20.3

Pinging 192.168.20.3: bytes=32 time=0ms
from 32 bytes of data:

Request timed out

Reply from 192.168.20.3: bytes=32 time=0ms TTL=127

Reply from 192.168.20.3: bytes=32 time=5ms TTL=127

Reply from 192.168.20.3: bytes=32 time=0ms TTL=127

Ping statistics for 192.168.20.3

Packets: sent=4 received=3 loss=1 (25.0%)

Approximate round trip time in milliseconds:
min = 0ms max = 5ms

Observation:-

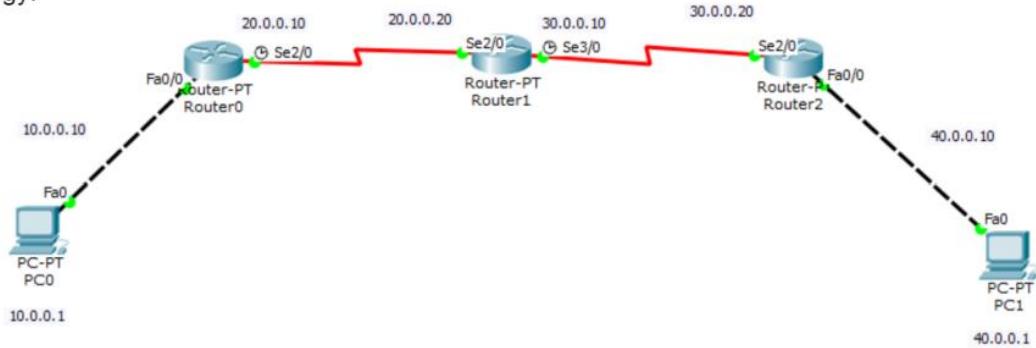
- 3 we can have one device on one VLAN & another on another VLAN connected to the same switch. They will only hear other broadcast traffic from within their VLANs - as if they were connected 2 switches
- 3 here VLANs doesn't use IP address instead deal with subnets / class C type addresses
- 3 Inter-VLAN routing gives a flexible tool to logically include these networks that may potential to enhance security & performance

NJ
3/18/2023

Experiment - 10

Aim: Demonstrate the TTL/ Life of a Packet

Topology:



OSI Model

Inbound PDU Details

Outbound PDU Details

PDU Formats

HDLC

0	8	16	32	32+x	48+x	56+x
FLG: 0111 1110	ADR: 0x8f	CONTROL: 0x0	DATA: (VARIABLE LENGTH)	FCS: 0x0	FLG: 0111 1110	

IP

0	4	8	16	19	31 Bits
	4	IHL	DSCP: 0x0	TL: 28	
			ID: 0x1	0x0	0x0
		TTL: 126	PRO: 0x1	CHKSUM	
			SRC IP: 40.0.0.1		
			DST IP: 10.0.0.1		
			OPT: 0x0	0x0	
			DATA (VARIABLE LENGTH)		

ICMP

0	8	16	31 Bits
TYPE: 0x0	CODE: 0x0	CHECKSUM	
ID: 0x3		SEQ NUMBER: 2	

OSI Model Inbound PDU Details Outbound PDU Details

PDU Formats

Ethernet II

0	4	8	14	19	Bytes
	PREAMBLE: 101010...1011		DEST MAC: 0060.3E33.E1A4	SRC MAC: 0050.0FDC.B57A	
	TYPE: 0x800		DATA (VARIABLE LENGTH)	FCS: 0x0	

IP

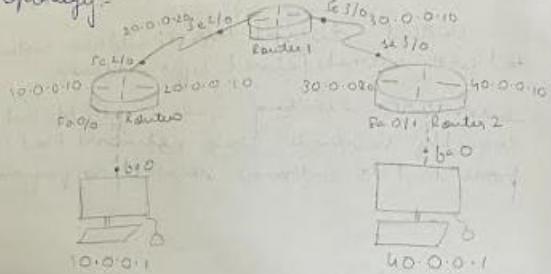
0	4	8	16	19	31	Bits
	IHL	DSCP: 0x0		TL: 28		
	ID: 0x1		0x0	0x0		
TTL: 125	PRO: 0x1			CHKSUM		
	SRC IP: 40.0.0.1					
	DST IP: 10.0.0.1					
	OPT: 0x0			0x0		
	DATA (VARIABLE LENGTH)					

ICMP

0	8	16	31	Bits
TYPE: 0x0	CODE: 0x0	CHECKSUM		
ID: 0x3		SEQ NUMBER: 2		

Aim:- Demonstrate the TTL life of a packet

Topology:-



Procedure:-

- Create a topology as shown above with 2 PCs and 3 routers.
- Set the IP address and gateway for both PCs.
- Configure the routers either static / default routing way.
- In simulation mode send a simple PDU from one PC to another.
- Use capture button to capture every transfer.
- Click on the PDU during every transfer to see the inbound & outbound PDU details.

0	4	8	16	18	31
4	11HL	DSCP		TL:128	
	10 0X6		OX	OXO	
TTL	221	PRO	0x1		CHRSUM
				SEC1P	10-0-0-1
			DST IP	40-0-0-1	
		OPT	0X0		OXO
		DATA (VARIABLE LENGTH)			

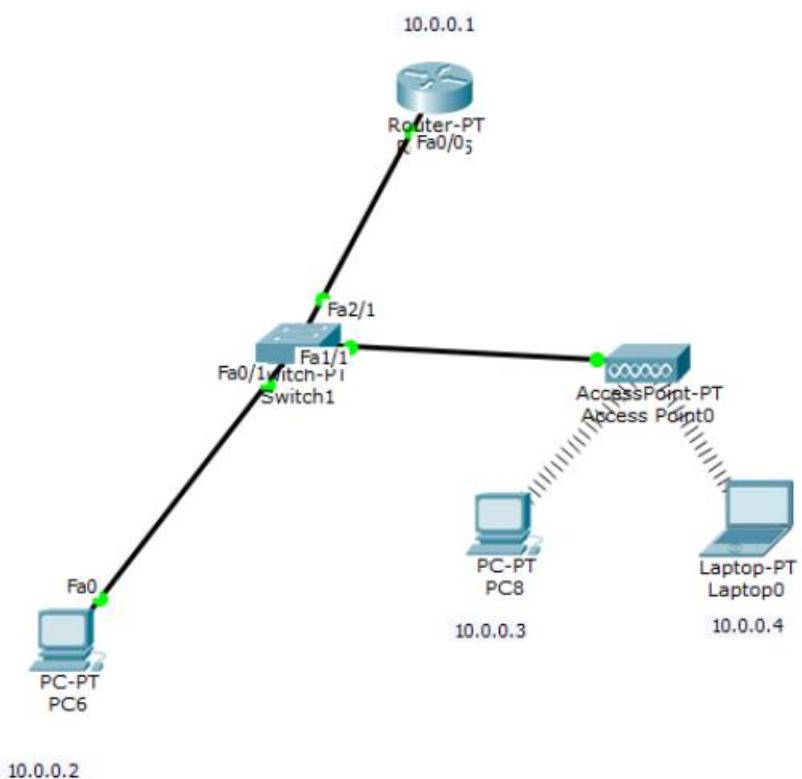
Observation.

- The no. of hops the packet travel before being discarded at TTL.
 - Datagram TTL field is set by the sender and reduced by each router along the path to its destination.
 - The router reduces TTL value by one while forwarding the packets.
 - When the TTL value is 0, the route discards and send an ICMP message.

2
31/5/2023

Experiment -11

Aim: To construct a WLAN and make the nodes communicate wirelessly



Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time=21ms TTL=128
Reply from 10.0.0.3: bytes=32 time=9ms TTL=128
Reply from 10.0.0.3: bytes=32 time=13ms TTL=128
Reply from 10.0.0.3: bytes=32 time=12ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 9ms, Maximum = 21ms, Average = 13ms

PC>
```

Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.4

Pinging 10.0.0.4 with 32 bytes of data:

Reply from 10.0.0.4: bytes=32 time=18ms TTL=128
Reply from 10.0.0.4: bytes=32 time=9ms TTL=128
Reply from 10.0.0.4: bytes=32 time=5ms TTL=128
Reply from 10.0.0.4: bytes=32 time=12ms TTL=128

Ping statistics for 10.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 5ms, Maximum = 18ms, Average = 11ms

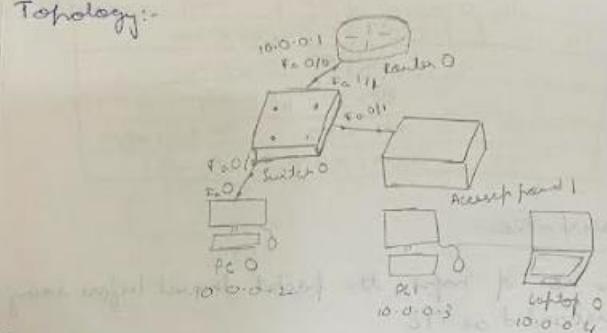
PC>
```

10/8/23

Lab - 11

Aim:- To construct a WLAN and make the nodes communicate wirelessly

Topology:-



Ping
Pc1
Pc2
Pc3
Router
Access point
PC1
PC2
Utopia

Procedure:-

- Construct the above topology
- Configure PC and Router as normally done
- Configure Access point 1 → SSID Name - WLAN
- Select to EP & give any 10 digit hex reg - 1234567890
- Config PC1 & laptop with wireless standards
- Switch off the device. Drag the existing PT-HOST in LHS to the component listed in RHS. Drag WMP300N wireless interface to the empty port. switch on the device.
- In the config tab a new wireless interface would have been added. New configure SSID, WEP, WPS key, IP address and gateway to the device.
- Ping from ~~any~~ every device to every other device.

ping output:-

Packet tracer PC command line 1.0
IC > Ping 10.0.0.3
Browsing 10.0.0.3 with 32 bytes of data
Request timed out.
Reply from 10.0.0.3: bytes=32 time=0ms TTL=127
Reply from 10.0.0.3: bytes=32 time=0ms TTL=127
Reply from 10.0.0.3: bytes=32 time=0ms TTL=127
Ping statistics for 10.0.0.3
Packets: sent = 4, received = 3, lost = 1 (25%), approx. 0ms
Approximate round trip times in milliseconds
min = 0ms max = 1ms, avg = 0ms

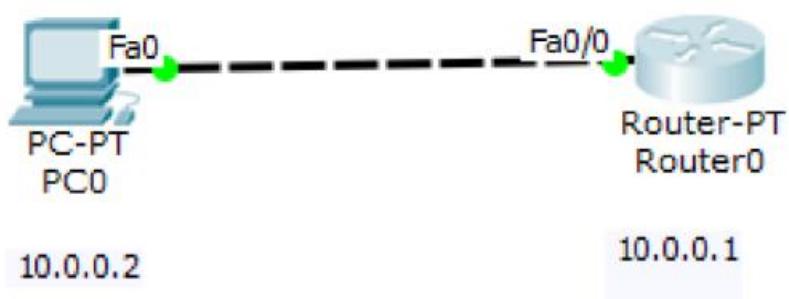
Observation:-

- A WLAN is a group of colocated devices that form a network based on radio transmissions.
- Data sent in packets contain layers with labels and instructions. MAC address to end points for routing.
- The access point is the base station and serves as a hub to ~~switch~~ with other stations connected.
- With one access point we can connect to multiple devices ~~simultaneously~~ and transmit data.

NJ
3/10/2023

Experiment - 12

Aim: To understand the operation of TELNET by accessing the router in server room from a PC in IT office.



Router0

Physical Config CLI

IOS Command Line Interface

```
Router>en
Router#cong t
^
% Invalid input detected at '^' marker.

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname r1
r1(config)#enable secret pl
r1(config)#interface fa0/0
r1(config-if)#ip address 10.0.0.1 255.0.0.0
r1(config-if)#no shut

r1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

r1(config-if)#line vty 0 5
r1(config-line)#login
% Login disabled on line 132, until 'password' is set
% Login disabled on line 133, until 'password' is set
% Login disabled on line 134, until 'password' is set
% Login disabled on line 135, until 'password' is set
% Login disabled on line 136, until 'password' is set
% Login disabled on line 137, until 'password' is set
r1(config-line)#password p0
r1(config-line)#
r1(config-line)#exit
r1(config)#exit
```

Command Prompt

```
Ping statistics for 10.0.0.1:  
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
    Approximate round trip times in milli-seconds:  
        Minimum = 0ms, Maximum = 3ms, Average = 1ms  
  
PC>telnet 10.0.0.1  
Trying 10.0.0.1 ...Open  
  
User Access Verification  
  
Password:  
Password:  
rl>en  
Password:  
rl#show ip route  
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP  
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area  
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2  
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP  
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter  
area  
      * - candidate default, U - per-user static route, o - ODR  
      P - periodic downloaded static route  
  
Gateway of last resort is not set  
  
C    10.0.0.0/8 is directly connected, FastEthernet0/0
```

Command Prompt

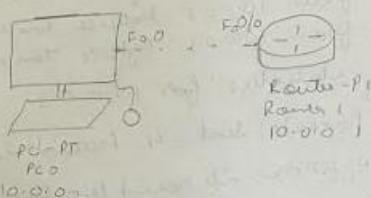
```
Packet Tracer PC Command Line 1.0  
PC>ping 10.0.0.1  
  
Pinging 10.0.0.1 with 32 bytes of data:  
  
Reply from 10.0.0.1: bytes=32 time=lms TTL=255  
Reply from 10.0.0.1: bytes=32 time=0ms TTL=255  
Reply from 10.0.0.1: bytes=32 time=0ms TTL=255  
Reply from 10.0.0.1: bytes=32 time=3ms TTL=255  
  
Ping statistics for 10.0.0.1:  
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
    Approximate round trip times in milli-seconds:  
        Minimum = 0ms, Maximum = 3ms, Average = 1ms
```

Lab-12

10/9/23

Aim :- To understand the operation of Telnet
by accessing the router in server room
from a PC in IT office.

Topology :-



Procedure :-

- Create a topology as shown above
 - Config the IP address & gateway for PCo
 - Config the router by executing the following commands
- Step 1: enable
Step 2: config t
Step 3: interface g1
Step 4: enable secret 1
Step 5: interface fastethernet 0/0
Step 6: ip address fastethernet 0/0
Step 7: No shut
Step 8: line vty 0 5
Step 9: login
Step 10: username fo
Step 11: Exit; Exit
Step 12: Cfg

ping message to router
password for user Access verification is p0
password for enable is p1
Accessing router C1 from PC
show IP routes

PING OUTPUT -

Packet Tracer PC command line 1.0
PC > Ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data

Reply from 10.0.0.1: bytes = 32 Time = 0ms TTL = 255
Reply from 10.0.0.1: bytes = 32 Time = 0ms TTL = 255
Reply from 10.0.0.1: bytes = 32 Time = 0ms TTL = 255
Reply from 10.0.0.1: bytes = 32 Time = 0ms TTL = 255

Ping statistics for 10.0.0.1

Packets sent = 4 Received = 4, lost = 0 (0% loss)

Approximate round trip times in milliseconds:

minimum = 0ms, maximum = 0ms, average = 0ms

PC > telnet 10.0.0.1

Typing 10.0.0.1 open

User Access Verification

Password: p0

P1) Enable

Password: p1

* If show IP routes

C 10.0.0.0/8 is directly connected,

FastEthernet 0/0

Observation:-

- TELNET stands for Teletype Network. It is a type of protocol that enables one computer to connect to the local computer.
- It is used as a standard TCP/IP protocol for ~~the~~ virtual terminal services provided by ISO.
- During TELNET operation, whatever is being performed on the remote computer will be displayed by the local computer. Telnet operates on a client/server principle.

N.D
31/8/2017

17/8/23

Code - 13

WAP for error detecting code using CRC-CCITT

Code:-

```
#include <stdio.h>
int arr[17];
void xor(int x[], int y[])
{
    int t = 0;
    for (int i = 0; i < 16; i++)
    {
        if (x[i] == y[i])
            arr[i] = 0;
        else
            arr[i] = 1;
    }
}

void main()
{
    int dd[17], dw[17], y[17], j, k;
    printf("Enter dividend in\n");
    for (j = 0; j < 17; j++)
        scanf("%d", &dw[j]);
    for (k = 0; k < 17; k++)
        dw[k] = 0;
    for (j = 0; j < 17; j++)
        dd[j] = 0;
    printf("Enter divisor in\n");
    for (j = 0; j < 17; j++)
        scanf("%d", &y[j]);
    for (j = 0; j < 17; j++)
        arr[j] = 0;
}
```

```

i = 0;
@p = 0;
for (i = 0; i < 17; i++)
    arr[k+i] = dw[i];
while (i < 33)
{
    if (arr[0] == 0)
        xor(arr, ze);
    else
        xor(arr, dd);
    arr[16] = dw[i++];
}
k = 0;
for (i = 17; i < 33; i++)
    dw[i] = arr[k+i];
printf("Code word:");
for (i = 0; i < 33; i++)
    printf("%d", dw[i]);
for (i = 0; i < 17; i++)
    arr[i] = 0;
printf("\n At receiver end\n");
k = 0;
for (i = 0; i < 17; i++)
    arr[k+i] = dw[i];
while (i < 33)
{
}

```

```

if (arr[0] == -1)
    arr[0] = p
else
    arr[0] = dd
arr[16] = div[i++];

3
k = 0;
for(i = 0; i < 8; i++)
    div[i] = arr[n + i];
for(j = 0; j < 8; j++)
    printf("%d", div[j]);
}

```

Output -

Enter the data word
1011001111001011
Enter divisor
10001000000100011

Codeword: 10110011110010110000000000000000

At receiver end

~~error free~~

Codeword: 10110011110010111000000000000000

NP
5/6/2013

Enter data to be transmitted: 1010101111

Enter the Divisor: 10101

Data padded with n-1 zeros : 10101011110000000000000000000000

CRC or Check value is : 1100

rem strlen is : 4

10101011110000000000000000000000

10101011110000000000000000100

10101011110000000000000000110

Final data to be sent : 10101011110000000000000000110

Enter the received data: 10101011110000000000000000110

Data received: 10101011110000000000000000110

Error detected

Process returned 0 (0x0) execution time : 38.224 s
Press any key to continue.

```
Enter data to be transmitted: 100011100011
Enter the Divisor: 1001

Data padded with n-1 zeros : 10001110001100000000000000000000

CRC or Check value is : 000

rem strlen is : 4
10001110001100000000000000000000
10001110001100000000000000000000
10001110001100000000000000000000

Final data to be sent : 10001110001100000000000000000000

Enter the received data: 10001110001100000000000000000000

Data received: 10001110001100000000000000000000
No error detected

Process returned 0 (0x0)   execution time : 20.893 s
Press any key to continue.
```

17/8/23

Lab - 14

congestion control using Leaky bucket algorithm

```
#include <stdio.h>
```

```
#include <stdlib.h>
```

```
int main()
```

```
{
```

```
    int buckets, outlets, R = 1, num, remaining;
    printf("Enter Bucket size and Outlets\n");
    scanf("%d %d", &buckets, &outlets);
    remaining = buckets;
```

```
    while (k)
```

```
{
```

```
    num = rand() % 100;
```

```
    if (num < remaining)
```

```
{
```

```
    remaining = remaining - num;
```

```
    printf("Packet of %.d bytes accepted in,\n",
```

```
    else
```

```
{
```

```
    printf("Packet of %.d bytes is discarded,\n",
```

```
    if (buckets - remaining > outlets)
```

```
{
```

```
    remaining += outlets;
```

```
    else
```

```
{
```

```
    remaining = buckets;
```

```
    printf("Remaining bytes : %.d\n", remaining);
```

```
    otherwise, if you want to stop input, press,
```

```
    scanf("%d", &k);
```

```
while (remaining > buckets)
{
    if (buckets - remaining > outlets)
    {
        remaining += outlets;
    }
    else
        remaining = outlets;
    cout << "Remaining bytes: " << remaining
    return 0;
}
```

Output

Bucket Bucket size & outstream size 2000 100

Packet of 41 bytes accepted

Remaining bytes: 2000

If you want to stop input, press 0, otherwise,
press 1.

Packet of 3167 bytes accepted

Packet of 324 bytes accepted

Remaining bytes: 1399

Remaining bytes: 1599

Remaining bytes: 1699

Remaining bytes: 1799

Remaining bytes: 1899

Remaining bytes: 1999

Remaining bytes: 2000

ND
31/8/2012

Lab-15

Client-server program using TCP/IP
socket

ClientTCP.py

```
from socket import *
serverName = '127.0.0.1'
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_STREAM)
clientSocket.connect((serverName, serverPort))
sentence = input('In Enter file name: ')
clientSocket.send(sentence.encode())
filecontents = clientSocket.recv(1024).decode()
print('In From Server: ', filecontents)
print('File contents')
clientSocket.close()
```

ServerTCP.py

```
from socket import *
serverName = '127.0.0.1'
serverPort = 12000
serverSocket = socket(AF_INET, SOCK_STREAM)
serverSocket.bind((serverName, serverPort))
serverSocket.listen(1)
```

while 1:

```
print("The server is ready to receive")
connectionSocket, addr = socket.accept()
sentence = connectionSocket.recv(1024).decode()
file = open(sentence, "r")
l = file.read(1024)
connectionSocket.send(l.encode())
print("Sent contents of " + sentence)
file.close()
connectionSocket.close()
```

IDLE Shell 3.11.2

```
File Edit Shell Debug Options Window Help
Python 3.11.2 (tags/v3.11.2:878ead1, Feb  7 2023, 16:38:35) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.

>>> ===== RESTART: F:/CN/cycle2/ServerTCP.py =====
The server is ready to receive

Sent contents of ServerTCP.py
The server is ready to receive
```

IDLE Shell 3.11.2

```
File Edit Shell Debug Options Window Help
Python 3.11.2 (tags/v3.11.2:878ead1, Feb  7 2023, 16:38:35) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.

>>> ===== RESTART: F:/CN/cycle2/ClientTCP.py =====

Enter the file name: ServerTCP.py

From sever:

from socket import *
serverName="127.0.0.1"
serverPort = 12000
serverSocket=socket(AF_INET,SOCK_STREAM)
serverSocket.bind((serverName,serverPort))
serverSocket.listen(1)
while 1:
    print("The server is ready to receive ")
    connectionSocket,addr=serverSocket.accept()
    sentence = connectionSocket.recv(1024).decode()

    file=open(sentence,"r")
    l=file.read(1024)

    connectionSocket.send(l.encode())
    print('\nSent contents of'+sentence)
    file.close()
    connectionSocket.close()
```

Lab 16

Client - server program using UDP
sockets to make client and server and server
to send back file contents.

ClientUDP.py

```
from socket import *
serverName = "127.0.0.1"
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_DGRAM)
clientSocket.sendto(bytes(sentence, "utf-8"),
                    (serverName, serverPort))
fileContents, serverAddress = clientSocket.recvfrom(2048)
print('In reply from Server:\n')
print(fileContents.decode("utf-8"))
# for i in fileContents:
#     print(str(i), end=" ")
clientSocket.close()
clientSocket.close()
```

ServerUDP.py

```
from socket import *
serverPort = 12000
serverSocket = socket(AF_INET, SOCK_DGRAM)
serverSocket.bind(("127.0.0.1", serverPort))
print("The server is ready to receive")
while True:
    sentence, clientAddress = serverSocket.recvfrom(2048)
    sentence = sentence.decode("utf-8")
    file = open(sentence, "r")
    car = file.read(2048)
```

serverSocket.sendto (bytes (con "utf-8"),
clientAddress)

found ("In Sent content of", end = ' ')

print (sentence)

for i in sentence:

#print (str(i), end = " ")

file.close()

```
Python 3.6.7 Shell*
File Edit Shell Debug Options Window Help
Python 3.6.7 (v3.6.7:6ec5cf24b7, Oct 20 2018, 13:35:33) [MSC v.1900 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: D:\AUG_DEC_2021\CN\LAB\cycle_3\ServerUDP.py =====
The server is ready to receive

Sent contents of ServerUDP.py
The server is ready to receive
```

```
Python 3.6.7 Shell*
File Edit Shell Debug Options Window Help
Python 3.6.7 (v3.6.7:6ec5cf24b7, Oct 20 2018, 13:35:33) [MSC v.1900 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: D:\AUG_DEC_2021\CN\LAB\cycle_3\ClientUDP.py =====

Enter file name: ServerUDP.py

Reply from Server:
from socket import *
serverPort = 12000
serverSocket = socket(AF_INET, SOCK_DGRAM)
serverSocket.bind(("127.0.0.1", serverPort))

while 1:
    print ("The server is ready to receive")
    sentence, clientAddress = serverSocket.recvfrom(2048)
    sentence = sentence.decode("utf-8")
    file=open(sentence,"r")
    l=file.read(2048)

    serverSocket.sendto(bytes(l,"utf-8"),clientAddress)

    print ('\nSent contents of ', end = ' ')
    print (sentence)
    # for i in sentence:
    #     print (str(i), end = '')
    file.close()
```

Lab - 17

(by)

wireshark functionalities

wireshark is similar to tcpdump in networking.

Tcpdump is a common packet analyzer which allows the user to display other packets and TCP/IP packets, being transmitted and received over a network attached to computer. ~~It has~~

it has a graphic end and some sorting & filtering functions.

wireshark users can see all traffic passing through the network.

wireshark can also monitor the unic~~cast~~ traffic which is not sent to network MAC address interface.

It is multi-platform software, i.e. it can run on Linux, Windows, OS X, FreeBSD, NetBSD, etc. *3/8/19*

It is a standard three ~~of~~ packet browser

It performs deep inspection of hundreds of protocols.

It performs live analysis

It makes the user view the data easily.